REMARKS

The Applicants' thank the Examiners for the courtesy of granting an interview on March 11, 2004.

Responsive to the Final Office Action of November 21, 2003, reconsideration of the above application is respectfully requested.

Independent claims 1, 12 and 43 are rejected under 35 U.S.C 103(a) as being unpatentable over Sugiyama *et al.* (US. 5,392,307) in view of Rice *et al.* (US. 5,283,844); and, independent claims 17 and 31 are rejected under 35 U.S.C 103(a) as being unpatentable over Sugiyama *et al.* (US. 5,392,307) in view of Rice *et al.* (US. 5,283,844) and further in view of Jayaraman *et al.* (WO 98/07218).

Sugiyama *et al.* teaches a VCSEL structure having DBRs made from alternating layers of AlGaAsSb and InAlAs materials, primarily to have small conduction band offsets between the alternating AlGaAsSb and InAlAs DBR materials (col. 6, lines 41-65); whereas, Rice *et al.* teaches a monolithic active waveguide crossbar switch having a substrate made from an InP material (col. 4, lines 45-50 and FIG. 2).

The Examiner contends that it is obvious to combine the InP from Rice's substrate with Sugiyama's AlGaAsSb/InAlAs (or AlGaAsSb/InGaAlAs) based DBR to reject the independent claims of the present invention.

Respectfully, the Applicants' disagree with the Examiner. Clearly, nowhere does Sugiyama *et al.* disclose, suggest or teach an InP layer in a DBR. In fact, even if it were possible to include the InP substrate from Rice's DBR in Sugiyama's DBR, to form either an AlGaAsSb/Inp DBR, or AlGaAsSb/InP/InAlAs DBR, or AlGaAsSb/InP/InGaAlAs DBR, this would significantly increase the conduction and valence band offsets between these layers. This combination would be contrary to what is required by Sugiyama's invention (viz., small conduction band offsets between the DBR layers as disclosed in col. 6, lines 41-65), and would induce a "band-bending" effect causing the forward-directional resistance of the VCSEL device

to increase substantially (col. 2, lines 40-52 in Sugiyama *et al.*). Therefore, it would inappropriate to combine the InP from the substrate of Rice with Sugiyama, since it would result in a DBR and a VCSEL device having a worse performance than the original DBR and VCSEL device of Sugiyama.

The law does not permit a proposed modification that would render the prior art invention being modified unsatisfactory for its intended purpose where there is no suggestion or motivation to make the proposed modification (see *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)). Furthermore, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified (viz., combining Rice with Sugiyama causing an increase in the conduction band offset thereby making worsening the operation of the DBR and VCSEL), then the teachings of the references are not sufficient to render the claims *prima facie* obvious (see *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

In contrast, by using alternating layers of an InP compound approximately lattice matched with layers comprising $Al_aGa_{1-a}As_bSb_{1-b}$, in the DBR of the present invention, the Applicants' have demonstrated far better properties for the DBR, such as, (i) improved thermal conductivity as compared to the InAlAs or InGaAlAs materials of the '*307* patent and as shown in FIG. 14, (ii) reduced voltage drop as shown by FIG. 13 (paragraph [0059] in the specification) and (iii) reduced optical loss (viz., higher reflectivity) as shown in FIG. 15 (paragraph [0064] in the specification).

Accordingly, claims 1, 12, 17, 31, and 43 have been amended to include the feature of a DBR comprising alternating layers of an InP compound lattice matched with layers comprising $Al_aGa_{1-a}As_bSb_{1-b}$.

Accordingly, it is requested that the rejections applied to independent claims 1, 12, 17, 31, and 43 be traversed.

Thus, in view of the above, it is submitted that this application is now in good order for allowance, and such early action is respectfully solicited. Should matters remain which the

Examiner believes could be resolved in a telephone interview, the Examiner is requested to telephone the Applicants' undersigned attorney.

Respectfully submitted,

Date: March 22, 2004

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